



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/802,037	03/17/2004	Andreas Bausewein	449122071100	3462
29177 7590 10/22/2007 BELL, BOYD & LLOYD, LLP P.O. BOX 1135 CHICAGO, IL 60690			EXAMINER OLSEN, KAJ K	
			ART UNIT 1795	PAPER NUMBER
			MAIL DATE 10/22/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/802,037

Applicant(s)

BAUSEWEIN ET AL.

Examiner

Kaj K. Olsen

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 6-14 is/are rejected.
- 7) ☒ Claim(s) 2-5 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |  |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413) .<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                        |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>3-29-05</u> . | 6) <input type="checkbox"/> Other: ____  |

## **DETAILED ACTION**

### ***Specification***

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

#### **Arrangement of the Specification**

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

- (a) TITLE OF THE INVENTION.
- (b) CROSS-REFERENCE TO RELATED APPLICATIONS.
- (c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
- (d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
- (e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
- (f) BACKGROUND OF THE INVENTION.
  - (1) Field of the Invention.
  - (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
- (g) BRIEF SUMMARY OF THE INVENTION.
- (h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
- (i) DETAILED DESCRIPTION OF THE INVENTION.
- (j) CLAIM OR CLAIMS (commencing on a separate sheet).
- (k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
- (l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 13, and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Kato et al (USP 6,290,829).

3. Kato discloses a method for operating a measurement probe 10A for measuring a gas concentration in a measuring gas with the aid of a solid electrolyte (12d, 12f) and has a measurement cavity 22 for holding the measuring gas, a measuring electrode 50 and an external electrode (32 or 26), a pumping current  $I_{p1}$  flowing between the measuring electrode and the external electrode transporting oxygen ions. See fig. 1 and 8 and col. 11, ll. 26-34. Kato further discloses a diagnostic unit 100 that checks the measuring electrode to ensure that the oxygen ion current is sufficiently large to indicate the electrode cell is appropriately working. In particular,  $V_g$ , which is a voltage proportional to the current flow through the measuring electrode, is checked to make sure its voltage is in excess of lower limit  $E_b$  to ensure that the any number of the electrodes, including the measuring electrode, have not failed. See col. 12, l. 35 through col. 14, l. 12 and col. 15, ll. 34-41. Malfunction, contamination, deterioration, or disconnection of an electrode is clearly a value dependent on the measuring electrode area.

4. With respect to when the measuring electrode is checked, see col. 14, ll. 22-32 and ll. 53-57.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 6, 7, 10, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato in view of Oshima et al (USP 6,071,393).

7. With respect to claims 6 and 7, Kato set forth all the limitations of claim 1 and further specified impressing a pumping current  $I_{p1}$  between the measuring electrode and the external electrode such a predetermined Nernst potential ( $V_{p1}$  or  $V_1$ ) is present at the measuring electrode. See col. 17, l. 51 through col. 18, l. 17. Kato did not explicitly disclose the use of a known oxygen concentration or varying the oxygen concentration. Oshima teaches in an alternate NO<sub>x</sub> sensor that the concentration of oxygen in the measuring gas impacts the measured signal seen at a pump cell downstream from the initial pump cell of the sensor. See fig. 11-13 and col. 18, ll. 27-67. Because the oxygen concentration in the exhaust gas can influence the pumping current seen at downstream pump cells (a point conceded by Kato when they state that the auxiliary pump cell 52 provides a measure of oxygen concentration in the gas in col. 11, ll. 26-34), it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize a known (i.e. predetermined) concentration of oxygen gas for the diagnostic procedure of Kato because Oshima teaches that this oxygen concentration has an effect on the measured response from pump cells downstream from the main pumping cell. Not utilizing a known concentration of oxygen could result in an improper determination of

Art Unit: 1795

sensor deterioration. For example a really high or really low concentration of oxygen gas could make  $V_g$  exceed the bounds set by voltages  $E_a$  and  $E_b$  respectively. Furthermore, Oshima teaches determining the proportionality between the pumping current and oxygen concentration (which inherently requires varying the oxygen concentration). See Test Examples B1 and B2 on cols. 31 and 32. Because a varying oxygen concentration with its subsequently determined proportionality would give a more comprehensive indication of sensor deterioration, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize this teaching from Oshima for the diagnostic routine of Kato in order to get a more comprehensive picture of the sensor deterioration or lack of deterioration.

8. With respect to claims 10 and 11, Kato set forth all the limitations of claim 1 and further specified impressing a pumping current  $I_{p1}$  between the measuring electrode and the external electrode such a predetermined Nernst potential ( $V_{p1}$  or  $V_1$ ) is present at the measuring electrode. See col. 17, l. 51 through col. 18, l. 17. Kato did not explicitly disclose the use of a known oxygen concentration or varying the oxygen concentration. Oshima teaches in an alternate NO<sub>x</sub> sensor that the concentration of oxygen in the measuring gas impacts the measured signal seen at a pump cell downstream from the initial pump cell of the sensor. See fig. 11-13 and col. 18, ll. 27-67. Because the oxygen concentration in the exhaust gas can influence the pumping current seen at downstream pump cells (a point conceded by Kato when they state that the auxiliary pump cell 52 provides a measure of oxygen concentration in the gas in col. 11, ll. 26-34), it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize a known (i.e. predetermined) concentration of oxygen gas for the diagnostic procedure of Kato because Oshima teaches that this oxygen concentration has

Art Unit: 1795

an effect on the measured response from pump cells downstream from the main pumping cell.

Not utilizing a known concentration of oxygen could result in an improper determination of sensor deterioration. With respect to comparing the pumping current set with a reference value, the voltages  $E_a$  and  $E_b$  set by Kato define a window of voltage proportional current that is deemed to be acceptable. Hence the range bounded by  $E_a$  and  $E_b$  constitutes a reference value that the pump current of Kato is being compared to.

9. Claims 8 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato and Oshima as applied to claims 6 and 10 above, and further in view of Kojima et al (USP 4,713,166).

10. The references set forth all the limitations of the claims, but Kato did not explicitly disclose the use of a cover layer on its measuring electrodes. Kojima teaches that pumping electrode can be subject to blackening and teaches that a porous cover layer (i.e. coating) over a pump electrode eliminates the occurrence of blackening. See abstract and fig. 4. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of a coating as taught by Kojima for the electrode of Kato so as to prevent blackening of the electrolyte. With respect to the method of Kato and Oshima establishing that the cover layer of Kojima has detached, Kato teaches that its method is useful for any number of electrode malfunctions including peeling-off of the electrode (col. 15, ll. 34-41). Hence, the method of Kato and Oshima would be able to detect detachment of the cover layer as well.

***Allowable Subject Matter***

11. Claims 2-5 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter: The prior art does not disclose nor render obvious the cumulative limitations of claims 1 and 2 with particular attention to the steps of impressing a predetermined constant pumping current, measuring the period of time until the measured Nernst potential jumps from small to large values, and establishing a defect in the measured electrode when the measured period of time falls below a predetermined threshold. The prior art also does not disclose nor render obvious all the cumulative limitations of claims 1 and 4 with particular attention to the steps of impressing a predetermined constant pumping current, varying the oxygen concentration in the measurement cavity, determining the oxygen concentration at which the measured Nernst potential jumps between small and large values, and establishing a defect when the determined oxygen concentration deviates from a reference value by more than a predetermined amount.

***Conclusion***

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Möder (USP 4,167,163) discloses the use of constant current and the monitored Nernst voltage as an indication of electrode well being, but doesn't utilize either the time component of claim 2 or the varying oxygen component of claim 4. DeBruin et al (USP



Art Unit: 1795

4,326,318) discloses the use of constant current applications for restoring the metal oxide reference electrodes, which reads free of the constant current application of claims 2-5.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (571) 272-1344. The examiner can normally be reached on Monday through Friday from 8:00 A.M. to 4:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AU 1795  
October 17, 2007

A handwritten signature in black ink, appearing to read 'Kaj Olsen', with a stylized flourish extending to the right.

**KAJ K. OLSEN  
PRIMARY EXAMINER**